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AUTHOR Rodriguez, Yolanda C.
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ABSTRACT

After presenting a research review indicating that English as a second language (ESL) secondary school students need to improve their thinking skills, this paper reports on a study in which 136 analogies were developed for use as tools to teach these students to read at inferential and applied levels. The vocabulary source for the analogies was the Dale-Chall List of 3,000 Words (1948). Seventh-, eighth-, and ninth-grade ESL students (N=6) participated in four 50-minute sessions in which they studied two of eight analogy types (semantic comparisons, nonsemantic comparisons, portion analogies, class, sequence, characteristics, degree of intensity, and source). Relationship sentences were used to check the accuracy of the analogy solution. Pre- and post-tests consisting of 25 analogies each showed that the students improved in their ability to reason analogically. Analogies at an appropriate vocabulary level can be taught to ESL students, who can also be taught higher level thinking skills such as inference, analysis, evaluation, and synthesis through analogies. Appendixes include analogy lists, a list of analogy types, sample relationship sentences, and the pre- and posttests. (CB)

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ANALOGIES FOR IMPROVING THINKING SKILLS IN ENGLISH AS A SECOND LANGUAGE

A PROFESSIONAL PAPER

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER OF EDUCATION

IN THE GRADUATE SCHOOL OF THE

TEXAS WOMAN'S UNIVERSITY

COLLEGE OF EDUCATION

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YOLANDA C. RODRIGUEZ, B.A.

DENTON, TEXAS

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Dedication

This paper is dedicated to my parents who believe in education, to my husband and children for their patience and support, and to my students who inspired me to begin this work.

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Chapter 1

Introduction

Students learning English as a second language (ESL) need to learn English for interpersonal communication as well as for academic achievement. However, the language competence required for academic success differs from the language competence required to communicate socially (Cummins, 1980). In many instances ESL curricula have emphasized communicative competence but have failed to focus on academic competence (Saville-Troike, 1984). Although learning English for social communication is necessary, ESL students need to learn to read and write in order to do well in the classroom. Not only do ESL students need to learn to read, but they also need to improve their thinking skills as they read. Several researchers have shown that thinking skills can be taught (Piaget, 1964; Sternberg, 1981; Taba, 1965). If thinking skills can be taught, two questions arise--what methods and which materials are appropriate. Analogies seem to provide a practical alternative to both questions. Nickerson (1981) mentioned analogies as one of several methods for improving thinking skills. Ignoffo (1980) stated that "Analogies are practical because they carry an implied context with them" (p. 520). To solve the

analogy a student must articulate, think, and solve a problem. These skills are important for all students but particularly for ESL students because these students often find themselves in a new and rapidly changing environment where thinking skills are in high demand.

Rationale for the Study

Why do ESL students need analogies as a tool for developing thinking skills? The need for students to learn to think critically is acute because basic skills will no longer equip them to meet the demands of the rapidly emerging information society. In Megatrends, Naisbitt (1982) explained that the United States is in transition from an industrial society with a focus on production of goods to an information society with a focus on creating, processing, and distributing information here and abroad. The demand for information workers is already evident and continues to increase. Naisbitt's list of information workers includes practically all the professionals plus programmers, clerks, secretaries, stock brokers, managers, and technicians.

The availability of vast amounts of knowledge due to high technology will require students to process this information on a daily basis. In order to do this

effectively and accurately, students will need to apply critical thinking skills.

A comprehensive assessment of reading achievement, covering ten years from 1979 to 1989, reported that secondary students in the United States lack critical thinking skills such as analysis, inference, and theorizing (Petrosky, 1982). This information was provided by the National Assessment of Educational Programs (NAEP), a federally funded testing program founded in 1969 to assess the educational achievement of students in various subjects such as reading, social studies, and mathematics (Micklos, 1982).

Petrosky (1982) added that students need practice and training in higher level reading and thinking skills. Sternberg (1981) supported this view and explained that intelligence may be regarded "as a set of information processing abilities that can be diagnosed and taught" (p. 18). He cited Feurenstein's (1979) thinking skills program as an example of this notion in operation. Vye and Bransford (1981) remarked that teachers tend to emphasize content rather than process. What students learn is given a greater priority than how they learn. Perhaps this explains why students have not mastered higher level skills. Students need to learn how to learn.

Although the need to train students to think critically is evident, there is a dearth of exercises that promote thinking skills in the most widely used ESL adult texts, the survival books. These texts are designed to help students acquire the necessary language skills and cultural orientation to function in their new surroundings (Vaut, 1982). A review of survival texts by Auerback and Burgess (1985) showed that some of these texts do not portray situations that apply to refugees and other newcomers to this country. Of greater importance was the finding that survival texts fail to teach the most important survival skill, critical thinking.

ESL students need to learn to solve analogies for another reason. Often they are required to take various scholastic achievement tests that contain analogies. Among these are the Preliminary Scholastic Aptitude Test (PSAT), Scholastic Aptitude Test (SAT), Woodcock Mastery Reading Test, and Cognitive Abilities Test (CAT) (see Appendix A). Generally, students are instructed on how to take tests but they are not instructed in solving analogies.

Analogies seem to be particularly useful for ESL students. First, they may be created or compiled according to the student's level of language

proficiency as determined by appropriate tests or teacher judgment. Even picture analogies may be used if the student's level of vocabulary warrants it. Second, the mechanics of working the analogies, as well as the analogies themselves, can be presented in the student's native language in order to expedite learning if the necessary resources are available. Finocchiaro (1973) wrote that a judicious use of the student's native language may be beneficial and expedient for instructional purposes if efforts in the second language fail to convey any meaning for the learners. Third, analogies relate the familiar with the unfamiliar. For all learners, and especially for ESL learners, this is important. Analogies enable students to create meaning in new experiences by relating the old with the new. According to Smith (1985) this is how learning occurs. Devall (1983) noted that analogies may help students recall information better, increase specific knowledge, and encourage more critical evaluation of information.

Purpose of Study

The purpose of this study was to develop analogies for secondary ESL students as a tool to help develop and improve thinking skills. A secondary purpose was to field test analogies with secondary ESL students to

familiarize them with the different types of analogies and to instruct the students in how to work analogies.

Statement of Problem

The background research shows that ESL secondary students need to improve their thinking skills. In order to do this, materials are needed. These materials should meet two conditions so that they are suitable for instruction. First, the vocabulary used in these materials should be appropriate for ESL students. Second, the materials should focus on developing and improving thinking skills.

ESL reading materials that meet these two criteria are often unavailable or limited at best (Auerback and Burgess, 1985). Frequently, ESL texts, like elementary texts, tend to emphasize literal type responses (Harris and Sipay, 1980). Although ESL students need to learn to read at the literal level, they also need to read at the inferential and applied levels--levels that require greater thinking ability.

Definition of Terms

For purposes of this paper, frequently used terms are defined as follows:

Analogy: a specific type of reasoning problem based on inductive reasoning. It usually follows the form A:B::C:D (A is to B as C is to D).

Cognition: a broad term that includes mental activities such as "perceiving relationships, comparing and judging similarities and differences, coding information . . . classification and categorization, and memory search and retrieval" (Sternberg, 1982).

Content area subjects: "subjects such as history, science, and English which have as a primary objective the acquisition of knowledge" (Bush and Andrews, 1980).

Creativity: "a purposive act which results in the production of unique and elaborate ideas which are novel to the creator. Creative production involves the person, the product, and the process" (Daniels, 1985).

English as a Second Language (ESL): the "teaching of English as a language along with its use as a medium of instruction" (Dubin & Olshtain, 1977). "a special course for learners who do not speak English natively . . . using 'foreign language' methods" (Whitmore & Rodriguez, 1978).

Language proficiency: the degree to which an individual demonstrates his or her linguistic competence in a language regardless of how that language may have been acquired (Jones & Spolsky, 1975).

Morphology: "the study of the change in forms of words produced by inflection or derivation"

(Finocchiaro, 1973).

Problem-solving: the process used to discover a solution to a situation with known and unknown elements (Sternberg, 1982).

Second language: the "official, non home language of a citizen in a country where he needs the official language for full participation in the social, political and economic life of that nation" (Paulston, 1974).

Semantics: "the study of word meanings and their effect on communication, interaction, and interpersonal relationships" (Finocchiaro, 1973).

Syntax: "the arrangement of words in utterances and sentences" (Finocchiaro, 1973).

Thinking skills: as opposed to basic skills such as reading, writing, and mathematics; thinking skills generally include the study of logic, inductive and deductive reasoning, and problem-solving.

Assumption

A basic assumption of this paper was that the students who received instruction in solving analogies and upon whom the analogies were field tested were representative of secondary level ESL students in their second year in an ESL program in a public school or community school.

Limitations

The analogies developed in this study were used by secondary ESL students in their second year in an ESL instructional program. Further implementation with a larger number of subjects will be needed before generalizations can be made.

The study was restricted to 136 analogies developed by the writer (see Appendix B). The vocabulary used in the analogies was restricted to terms selected from the Dale-Chall List of 3,000 Words (1948) (see Appendix C). The analogies were written according to the Aristotelian paradigm listed by Devall (1983) which categorizes the eight most frequently used analogy types (see Appendix D).

Chapter 2

Review of Literature

Problems Related to Learning ESL

For the past 25 years the number of limited English speakers (LES) has increased in the United States. The Department of Education has predicted that the number of LES children between 5 and 14 will continue to increase until the end of this century (Enright and McCloskey, 1985). As a result of this growth, public schools throughout the United States will continue to be challenged to meet the educational needs of large numbers of students who represent a great diversity of languages and cultural backgrounds.

At the same time that LES students are growing in numbers, the United States is experiencing a period of educational reform. At this time 46 states have passed legislation implementing programs for educational change; 43 states have changed graduation requirements in an effort to raise standards (Cardenas, 1985). These changes are also reflected in ESL. In 1980, Cummins differentiated between language for interpersonal communication and language for academic learning. He pointed to the need for expanding the language parameters of students. In 1984, Saville-Troike said that it was time to change

priorities from oral language proficiency to academic achievement. For ESL teachers the challenge is two-fold: to teach for language proficiency and to teach for academic achievement. However, to understand the educational needs of these ESL students, it is necessary to understand the problems they encounter in learning English.

Zintz (1971) listed six differences between learning a first language and learning a second language in school.

1. Unlike first language learners, second language learners do not have the six years of language experience in the second language that the former have.
2. Speaking, reading and writing are taught concurrently and the second language learner is expected to learn these simultaneously.
3. The amount of time the second language learner hears and speaks the language may be limited. The first language learner may hear and speak the home language exclusively while the second language learner may hear and speak the language only at school.
4. Learning the first language is an effortless process. Learning a second language involves

learning new patterns for listening, repeating, and memorizing.

5. The second language learner self-corrects as language is acquired. Sometimes this involves unlearning a previously practiced habit.
6. The second language learning environment differs from the first language learning environment. Generally, the former is more pressured and alien than the latter.

In a more specific Fletcher (1983) surveyed 800 sources and selected 140 that pertained to American Indians. Although his study investigated a specific language group, Fletcher stated that much of the information applies to second language learners of English in general. The study includes the four major areas of language: phonology, morphology, syntax, and semantics.

In the area of phonology the survey showed that American Indians have problems with vowel-phonemes; consonants, especially the voiced and unvoiced stops; and the voiced th in thing and the unvoiced th in then. Speakers of ESL generally experience problems with sounds that are nonexistent or sounds that do not have an exact match in the first language.

Some of the problems in morphology for ESL

learners occur in the use of inflections, gender, number, and tense. Wolfram, Christian, Leap, and Potter (1979) studied written language samples of American Indians and found that English irregular verbs are particularly difficult. Cook and Sharp (1966) reported prepositions in English idioms as a problem. Garcia (1974) wrote that Chicanos hispanize English words and anglicize Spanish words. They may also substitute words in one language for words in the other language such as in the sentence, Vamos a la dance.

In relation to syntactical problems, Garcia (1974) stated that Chicanos in his study did not show problems in syntax. Fletcher (1983) wrote that there are few studies that discuss this area but that speakers of languages with a Subject-Object-Verb structure may have problems in learning English, a Subject-Verb-Object language. Lehman (1983) noted that 50% of the world's languages are Subject-Object-Verb languages and that syntax is one of the most difficult areas for nonnative speakers due to the different classes of verbs and their complements in English.

According to Fletcher (1983), perhaps the most significant fact about semantics is that learning a language involves learning a large vocabulary in that language. Saville-Troike (1984) supported this view

and concluded from results of her study that knowing vocabulary in the language that is used for instruction is the single most important factor in learning content.

To summarize, the language problems of ESL students center in the areas of phonology, morphology, syntax, and semantics. Those teaching ESL students need a knowledge of general and specific language problems in order to provide appropriate instruction for their particular students.

Views on Thinking and Reasoning

The development and improvement of thinking skills while learning English is an important goal for ESL students. Views on the concepts of critical thinking and reasoning follow.

Aylesworth and Reagan (1969) defined critical thinking as "the mental skill of solving problems in the manner of the practitioner" (p. 4). The practitioner is one who is allowed to learn by trial and error, one who learns through discovery. This type of thinking emphasizes how to think rather than what to think. Dewey (1933) specified five steps that are part of the discovery method. These are: identifying the problem, getting facts, formulating a hypothesis, testing the hypothesis, and drawing conclusions.

Of the four types of thinking listed by Aylesworth and Reagan (1969), the first is the persistency method. This refers to following the established procedure simply because that is the way things have been done in the past.

The second, the testimonial method, bases decisions on the testimony of others. Advertisers promote this type of thinking.

The third type is the innate process or intuitive reasoning. Kneller (1979) wrote that "intuitive knowledge is knowledge that a person finds within himself in a moment of insight" (p. 19). Expressions of talent are examples of the innate process.

Of the four types of thinking, critical thinking is the most complex. It requires two reasoning abilities--analysis and synthesis. The former, called deductive reasoning, involves separating a whole into parts, going from the general to the specific. An outline for a piece of writing is an example of analysis (Aylesworth & Reagan, 1969).

Synthesis, or inductive reasoning, involves the inverse process. It deals with taking the parts and unifying them into a whole, going from specifics to generalizations, from premises to conclusions. Scientific experiments are examples of synthesis. This

type of reasoning leads to the creation of new ideas (Aylesworth & Reagan, 1969).

In The Teaching of Thinking, Nickerson, Perkins, and Smith (1985) discussed thinking skills from a broader perspective including three areas: problem solving, creativity, and metacognition. Their selection was based on the availability of experimental literature on each of these topics. Steward and Tei (1983) explained metacognition as "a person's awareness and understanding" (p. 36) of what one knows and of how one knows.

Sternberg (1981) offered his view of intelligence in what seems to be one of the most comprehensive and clearest explanations in the literature. He stated "that intelligence consists of a set of developed thinking and learning skills used in academic and everyday problem solving" (p. 18). He listed nine essential cognitive skills for problem solving.

1. Identify the problem.
2. Select a process or a set of processes to solve the problem.
3. Select a representation of information. These include diagrams, outlines, graphs or other types of organizers.
4. Select a strategy that will expedite the

process in appropriate sequence.

5. Allocate appropriate time to task.
6. Monitor solution processes. Keep track of the work that has been completed, work in progress, and work that needs to be done.
7. Be sensitive to feedback. An awareness and understanding of feedback helps in solving future problems.
8. Act on feedback. Know what to do with it. It is important to know how to make changes in performance.
9. Implement an action plan. This pertains to motivation as well as to cognition. Full potential for improving performance cannot be achieved unless the action plan is implemented.

Sternberg (1981) concluded that existing intelligence tests do not measure these abilities adequately and in some cases not at all. He concluded that research in testing instruments is needed. On the other hand, operational thinking skills programs provide positive evidence that these skills can be taught.

In summary, Aylesworth and Reagan (1969) explained different levels of thinking and established that

critical thinking is the most complex and the most useful because it leads to problem solution. Synthesis appears to be a most valuable ability because it leads to the creation of new ideas. More recent studies have broadened the concept of thinking to include, in addition to problem solving, creativity and metacognition--a mental tracking system of one's own thought processes. Finally, the concept of intelligence by Sternberg (1981) establishes intelligence as skills that can be taught and specifies nine skills that are essential for problem solving.

Thinking Skills Programs

The purpose of thinking skills programs (see Appendix E) is to help students develop their potential as thinkers and learners (Bransford, 1979). Thinking skills programs are designed to help learners learn processes. They emphasize how to think rather than what to think. (Vye & Bransford, 1981).

Not all thinking skills programs are alike although they share similarities. First, most students in these programs learn that there are processes and sequences to follow in solving problems. Second, students tend to gain self confidence because they learn to do things that once seemed quite difficult. Third, students show gains when tested on skills that

are identical to those taught (Vye & Bransford, 1981; Sternberg, 1984).

Sternberg's (1984) guidelines for program selection included descriptions as well as weaknesses and strengths of three thinking skills programs.

The Instrumental Enrichment (IE) program is designed for children in grades 5 to 10 ranging in ability from retarded to gifted. It is also appropriate for children from all socioeconomic levels and for children from majority and minority cultural backgrounds (Sternberg, 1984).

The focus of IE is on problem solving. Students analyze strategies for solving problems and then evaluate their strategies through group discussions rather than through reading. Reading ability is also minimized because students work with figures and pictures. The material consists of thirteen units or instruments each on a particular intellectual skill. The students are required to figure out various strategies for solving interesting problems. IE may be taught in a two-year period three to five times a week. The program may be extended or shortened based on the students' needs (Sternberg, 1984).

Some drawbacks to this program include extensive teacher training and a narrow focus on thinking skills;

namely, those required on IQ tests. There is the question of limited transfer of skills to content area subjects and to everyday problems (Sternberg, 1984).

The Philosophy for Children (PC) is designed for students in grades 5 to 8 although there are other forms of this program for students in grades 9 to 12 (Vye & Bransford, 1981). PC materials are texts that students read and discuss. The discussions concern characters in stories who apply reasoning processes to the solution of problems or situations in their lives. The reading level of the texts requires that the students read on grade level or higher. This limits this program to students on grade level. The reasoning exercises also require an average to above average level of reasoning. Sternberg (1984) pointed out that PC requires a competent teacher and that some of the reasoning exercises may pose problems for some teachers.

This program has certain advantages. The reading material is interesting and exciting. PC, unlike IE, integrates thinking skills in the content areas. Sternberg (1984) wrote that it is one of the best programs in that it enables students to transfer thinking skills to content area subjects.

A limitation of this program is its middle to

upper class orientation. Identification with characters in the text may be a problem for children from lower socioeconomic classes (Sternberg, 1984).

The third program, the Chicago Mastery Learning Reading (CMLR) program is designed for grades 5 to 8. Its focus is on learning strategies and on study skills. The materials in this program include four books on different learning strategies. Each grade studies two units, one on comprehension and one on study skills.

CMLR is characterized by the following:

1. All students can learn if given the opportunity.
2. Learning occurs when lessons proceed from simple concrete concepts to less concrete, complex concepts.
3. Each instructional unit requires testing to find out if students have mastered concepts taught or if remediation is necessary.
4. Each learning unit consists of a variety of specific parts such as teacher presentation and guided, independent, and enrichment student activities (Sternberg, 1984).

CMLR's notable difference is that it can be implemented in the existing curriculum, usually in the

reading program. Its focus on learning strategies differs from IE and PC's focus on thinking skills (Sternberg, 1984).

Like IE, CMLR can serve students from varied economic and intellectual levels. CMLR requires considerably less teacher training than IE. This is an important consideration in numerous school communities (Sternberg, 1984).

CMLR's weaknesses center on its materials, curriculum and theoretical base. The materials in this program are not as interesting as those in PC and IE. The skills taught are limited to comprehension and study skills. Unlike IE and PC, CMLR deviates somewhat from a psychological theory of cognition (Sternberg, 1984).

In summary, all of these programs have much to offer to large numbers of students. The benefits reported by those who have used these programs justify their implementation. If thinking is to be taught, these programs and others similar to these, merit consideration provided they satisfy requirements imposed by the students, teachers, and administrators who will use them.

Significant Studies on Analogies

Schema, a recent development, makes the study of

analogy relevant because this theory assumes that learning and understanding occur when human beings relate prior knowledge--knowledge accumulated through experience--to new knowledge. Like schema, analogical reasoning is basically relating something familiar to something unfamiliar in such a manner that new knowledge is acquired. If prior knowledge plays such an important role in learning, a vital question is what happens to the learner whose frame of reference or background is limited or nonexistent (Vosniadou & Ortony, 1983).

Several studies have shown that analogy is a useful learning aid in bridging the known with the unknown and serves to increase learning. Hayes and Tierney (1982) cited some of the research done in the area of analogy in text. For example, memory experiments conducted by Schustack and Anderson (1979) showed that analogy promoted elaborate encoding of information and improved memory when old and new information are closely related. Ausubel and Fitzgerald (1961) found that giving students analagous material to read before they read a passage containing new material resulted in superior learning. Mayer (1975) found that analogies, illustrations and examples seem to elicit relevant knowledge structures for

learning.

The experiment by Hayes and Tierney (1982) investigated the effectiveness of analogy in learning as well as the manner in which it was effective. The latter emphasis made this experiment novel. The experiment focused on three possible functions of analogy: "to activate specific analogous knowledge, to activate generally related knowledge, or to supply information which readers use to fashion their own comparisons" (p. 256).

The subjects were high school students from a public school in North Carolina. A variety of materials was used, including pretests to assess background knowledge and instructional texts with and without analogies. The results showed that the most gains were made in acquiring a general knowledge of the unfamiliar topic--cricket--when readers were provided general information as well as explicit analogies. The conclusion was that the use of analogies was effective in the three previously mentioned functions and that increasing background knowledge through analogies or by other means facilitates learning new information (Hayes & Tierney, 1982).

According to Vosniadou and Ortony (1983), their study was the first of its kind because children, and

not adolescents or adults, were used as subjects. The purpose of this study was to find answers to two specific questions. First, does the presentation of new material using analogy drawn from familiar material result in children learning more than if new material is presented without analogy. Second, if children do transfer knowledge from the familiar to the unfamiliar, are they capable of knowing which aspects of knowledge to transfer.

The subjects, 16 children from grade one and 16 children from grade three were divided into two groups--one with and one without access to analogies. The children listened to two passages on how blood circulates and how an infection heals. In the analogy group, the blood circulating was compared to trains travelling; in the other, an infection was compared to an invasion. After listening to the two passages, the children answered literal and inferential questions. The children in the analogy group answered questions more accurately than the no-analogy group. Another finding was that the infection/invasion analogy produced more knowledgeable responses than the blood circulating/trains travelling analogy. This suggests that some analogies may work better than others. (The researchers did not specify whether the children were

more knowledgeable about invasions than about trains travelling). The results suggest that analogy may aid the transfer of knowledge from a familiar topic to an unfamiliar domain even among primary children (Vosniadou & Ortony, 1983).

Hayes and Henk (1984) conducted a study to investigate the way readers use pictures and analogies to understand and remember written directions, specifically how to tie the bowline knot. The subjects, 102 high school students, were assigned at random to one of six groups. The independent variables were type of text, mode of illustration, and time of recall. The results showed that readers understood written directions better when instructions were accompanied by pictures. When the instructions included pictures and textual support, readers relied on pictures more. For short term recall or immediate recall literal directions plus pictures provided good results. For long term retention analogy seemed to be more effective.

The previously mentioned experiments seem to indicate that analogy as a teaching strategy is effective.

In using analogy for instructional purposes, a topic or concept that is new or difficult for the

learner is compared to a topic or concept that the learner already understands. Analogies may be presented in different forms--graphic, textual, or aural.

A limitation of the use of analogies in text is that the reading time may be extended because the reader must read the analogous material as well as the passage containing new information. Simons (1984) suggested that the benefits gained in comprehension merit the use of analogies in spite of the additional time requirement. Another limitation involves the use of analogies that do not make good comparisons or are too abstract. Such analogies tend to confuse learners.

Analogies: Direct Instruction and Instructional Strategies

Although analogical reasoning is a natural thinking process, and the experimental literature shows analogy facilitates learning, relatively few studies deal with teaching students to reason analogically. Unlike other studies which examine the effectiveness of analogy in comprehension and learning, the study by White and Alexander (1984) examined the effectiveness of direct instruction on children's ability to solve analogy problems.

In this study two classes of fourth and sixth

graders received instruction in three 50-minute sessions. One class received direct instruction in the four analogy solution processes identified by Sternberg. These are encoding, inferring, mapping, and applying. The other group received instruction in the Directed Reading Thinking Activity (DRTA). Before and after instruction, the students were given an analogy portion of the Woodcock Reading Mastery Tests, Forms A and B. The results showed that the group receiving direct instruction in solving analogies made significant gains in comparison to the group instructed in the DRTA (White & Alexander, 1984).

As an instructional strategy, analogies may be used with almost all levels of students and in most areas of the curriculum. For example, Ignoffo (1980) used them to build vocabulary in English classes as well as to help students develop thinking skills. He found that they are a superior teaching tool. To solve the analogy students must study the terms of the two pairs of terms in a precise manner, think how the terms relate to each other and express the relationship in sentences, and reason deductively and inductively. (Ignoffo did not elaborate on the last process).

Bellows (1980) wrote that analogies are concise, powerful, and well-liked by students. They can be used

to teach concepts in English, social studies and science. Concepts from separate subject areas can be compared through analogies. For example, the human heart, a health concept, can be compared to a mechanical pump, a physical science concept.

As supplementary reading aids, analogies teach students to look for specific details, use the context in each word pair, draw conclusions, use multiple meanings of words, think imaginatively, summarize, and articulate original ideas (Bellows, 1980).

McGeehon (1982) used analogies as one of several strategies to teach textbook comprehension and to raise standardized test scores among potential high school dropouts. She stressed that some high school students do not understand expository text, the type of writing used in content area texts because reading materials in elementary are essentially narratives.

By studying analogies students in McGeehon's class discovered relationships based on comparison and contrast, cause and effect, and sequence. Then through specific, clear explanations students transferred their thinking skills to the reading process. They found that expository text and analogies share some of the same organizational patterns (McGeehon, 1982).

The time spent on the total program was not given.

However, the author reported a gain of 2.4 years on the California Achievement Test which was given as a pre and posttest (McGeehon, 1980).

Whimbey and Lochhead (1980) included analogies in teaching analytical reasoning. Their method for teaching analogy solution includes five steps.

1. Provide an analogy for the students.

   Example: A cook is to a kitchen as a secretary is to an office.

2. Provide three relationship sentences. Explain to students that both pairs of terms must fit in the correct relationship sentence. Have students choose the correct relationship sentence.

   Example: A _____ is a(n) _____.

   A _____ cooks in a(n) _____.

   A _____ works in a(n) _____.

3. Write relationship sentences.

   Example: A cook works in a kitchen.

   A secretary works in an office.

4. Complete a different analogy and explain the relationship.

   Example: Roads are to cars as:

   wheels are to bicycles

   lights are to traffic

* tracks are to trains

paths are to rabbits

5. Practice solving more analogies. Change the missing terms.

Example: Find A and D or find B and D.

In Whimbey and Lochhead's (1980) teaching model, the two word pairs in the analogy must fit into the relationship sentence. The authors recommend that students verbalize the process and then write the relationship sentence. This insures that no steps are omitted. In order to monitor the analogy solver, students should work in pairs or small groups.

Devall (1983) recommended another method called AEIOU and Sometimes Y. This method focuses on the student discovering the processes in analogy solution. First, the teacher presents several types of analogies. The students analyze the various types of relationships expressed in the analogies. After the students are familiar with different types of relationships, the teacher provides analogies in which one or two terms are missing. The students should practice until they learn the necessary technique.

After students learn to solve analogies, the teacher may read a passage to them and create an analogy that pertains to the passage. The students

should discuss the relationship. They should also write an analogy for the same passage and justify why they chose that relationship (Devall, 1983).

In the next activity, the students should read a passage independently. An analogy provided by the teacher should be discussed by the students. Again, they should discuss the relationship (Devall, 1983).

Finally, the students should develop analogies after reading a passage. The discussion may also include the effect of each student's prior knowledge and perspective as explanations for differences in analogies (Devall, 1983).

The acronym AEIOU and Sometimes Y stands for Analyze relationships, Explain, Instruct, Organize, Use; Sometimes Y stands for You, the teacher. The teacher's role is to provide structure and encouragement to the students. The final goal is for students to become critical thinkers and critical readers on their own (Devall, 1983). Analogies may very well help them achieve this goal. For ESL students, analogies are an excellent tool because they can use their diverse backgrounds to create meaning.

Chapter 3

Procedures

The following is a description of how this study was conducted. It includes the procedures used to develop the analogies and an explanation of the subjects, setting, instructional sessions, and testing instruments (see Appendix F for pretest and posttest).

Vocabulary Source

A preliminary procedure was to select the appropriate vocabulary for writing the analogies. To do this, it was necessary to determine the vocabulary source for the ESL text series, English for a Changing World (ECW), (Wardhaugh et al., 1976), the text used by the students in this study. In response to a telephone call, the publishers of ECW, Scott, Foresman and Company, notified the writer that the Dale-Chall List of 3,000 Words (1948) was the vocabulary source for the ECW series (see Appendix C). The Dale-Chall list is used with a readability formula intended to indicate reading level of materials. The list includes 3,000 words that were familiar to 80% of fourth grade children in the sample studied by Dale and Chall.

Identification of Analogy Types

The next step was to determine the types of analogies that would be used. Devall's (1983) list was

selected because it is limited to eight major types subsumed by two to seven minor types (see Appendix D). Using this paradigm, the eight analogy types could be taught and tested in five class sessions limiting the presentation of two analogy types to each of four sessions.

Development of Analogies

Having the Dale-Chall list (1948) as a vocabulary source and a list of analogy types, work on developing the analogies began. These were written by selecting terms that in the writer's judgement were familiar to second year ESL students at the secondary level. In most cases, the terms were used as listed in the Dale-Chall list except for the addition of plural forms or the addition of ing, d, or ed to verbs.

One hundred fifty-eight analogies were written. This number included four examples for each minor type of analogy or from 10 to 28 analogies for each major type. One hundred thirty-six analogies were selected for field testing because this number limited the presentation to two analogy types including approximately 20 analogies in each of four sessions. The fifth session consisted of a review and a posttest. In the field test, this appeared to be an appropriate learning load for the students.

Prior to field testing, each analogy was checked by using a relationship sentence according to Whimbey and Lochhead's (1980) teaching model (see Appendix G for sample relationship sentences). If an analogy required a relationship sentence that in the writer's judgment was too complex in structure for ESL students, a similar analogy with a less complex structure was substituted.

Description of Setting and Subjects

Six students who attended a church sponsored 12-week evening ESL class participated in the study. The six, who were also public school students, were selected from a larger group of adults and adolescents. Those selected had completed one year of ESL instruction and were secondary level students in grades 7, 8, and 9. All the students were native Spanish speakers and exhibited very limited English speaking ability in class.

Instructional Sessions

The goal of the study was to familiarize students with analogies and as a result develop thinking skills. The students were instructed by the writer in five 50-minute sessions. A schedule of instruction follows.

Session	1	Introduce analogies. Pretest.
		Introduce analogy types 1 and 2.
Session	2	Review analogy types 1 and 2.
		Introduce analogy types 3 and 4.
Session	3	Review analogy types 3 and 4.
		Introduce analogy types 5 and 6.
Session	4	Review analogy types 5 and 6.
		Introduce analogy types 7 and 8.
Session	5	Review analogy types 7 and 8.
		Review analogy types 1-6. Posttest.

Session one: The students were told that the goal of the five sessions was to learn to solve a special kind of word problem and as a result become better thinkers. An analogy was defined as a word problem made of two word pairs that are related in the same way. After an explanation on how to read analogies, the students took the pretest.

The first type of analogy, semantic comparisons, was introduced by asking students how word pairs such as <u>hot and cold</u>, <u>black and white</u> were related. They were encouraged to express themselves aloud. After they responded that the word pairs were opposite (palabras opuestas), they were asked to select from three sentences containing blanks, the sentence that best expressed how the word pairs were related.

_____ is _____.

_____ means the same as _____.

_____ is the opposite of _____.

The students learned that in solving an analogy, both word pairs must make sense when used in a special type of sentence called a relationship sentence.

After working several analogies in a group, the students worked in pairs. Their instructions were to solve the analogies by telling each other how the word pairs were related and by choosing the correct relationship sentence from the board. The students were reminded to monitor each other and to help each other think clearly and logically.

After the students completed a practice exercise, they read the completed analogies and corresponding relationship sentences aloud. They checked their work. Incorrect responses were discussed and analyzed. Analogies of the second type, non semantic comparisons, were discussed. The students discovered that these analogies were not related in meaning but in form or sound. Students remarked, "They look same. They sound same." The group practiced one or two analogies of each minor type and then worked in pairs. Again they were instructed to think aloud and to choose the correct relationship sentence for each analogy. At the

end of the session, performance was checked. Incorrect responses were discussed and students were asked to give reasons for incorrect responses for the analogies as well as for the relationship sentences.

Session two: The students reviewed analogy types 1 and 2. Type 3 analogies, portion of, were introduced by asking students to select from the words, page and book, the word which represented a part of the other object (part-to-whole relationship). The concept of classification according to portion was established by using word pairs such as mouth and face, eraser and pencil. Analogies of the part/whole type were written on the board. The students worked the analogies and selected the corresponding relationship sentences.

In the practice exercise of the next minor type, whole/part, the students were asked to form a relationship sentence on their own. When a student articulated a relationship sentence in English or Spanish, the sentence was written on the board in English and word pairs were placed in the blanks. The students were asked if the sentence made sense. Sometimes several sentences were written and "tested" by using both word pairs in the blanks, before the students agreed on the correct sentence.

Analogies of the fourth type, class, include

co-ordination, sub-ordination, and superordination. The students did not experience much difficulty with these since they were able to use the same or similar relationship sentences as in the third type, portion of. At the end of the session the students checked their performance and discussed incorrect responses.

Session three: Analogy types 3 and 4 were reviewed. Sequence, analogy type 5, was introduced as a concept involving forward or backward movement. The words before and after were discussed. The students solved the analogies without difficulty although they had to create several relationship sentences before arriving at the correct one.

The sixth analogy type, characteristic, includes seven minor types. The students grasped the meaning of the word characteristic because it is similar to the Spanish word, caracteristica. The students worked in a group, then in pairs. Forming the relationship sentences seemed to be more difficult than solving the analogies. Performance was checked after they completed the practice exercise.

Session four: The students reviewed the analogies studied during the previous session. The last two analogy types were presented--degree of intensity and source. The concept of degree was easily understood by

showing degrees on a thermometer and asking, "Is it hot at 90°?" "Is it hotter at 110°?" The concept was extended by asking students to differentiate between looking and staring, talking and whispering. Subsequent procedures were the same as in previous sessions.

Session five: The students reviewed analogy types 7 and 8 followed by a cumulative review of analogy types 1-6. The posttest was given. After the tests were returned to the students, incorrect responses were discussed.

Pretest and Posttest

The analogies included in the pretest and posttest were selected from the core of 136 analogies developed in this study (see Appendix G). Items for the test were determined by selecting six analogies from each major type plus two analogies from association, a subheading of analogy type six, characteristic. Each time an analogy was designated for the pretest, an analogy of the same type was designated for the posttest. Each test included 25 analogies with at least 3 analogies from each major type. Both objective tests required that the student complete each analogy by selecting one of four terms. Generally the choices given as possible answers were related in some way to

the first term in the second part of the analogy. Only one term, however showed the correct relationship.

The pretest was administered by the writer during the first session. The students did not receive instruction in analogy solution prior to taking the test. Instructions for taking the test included a definition of an analogy plus an explanation of the symbols : (is to) and :: (as) used in formal analogies. The students were told that they would not receive help with vocabulary. They were encouraged to try to work all the analogies. Although the test was not timed, all the students completed the test within 30 minutes.

The posttest was administered by the writer during the fifth session. The format for this test was identical to the pretest. The last word in the second part of the analogy was left blank. The students were required to complete each analogy by selecting the correct term from four choices. Prior to taking the test the students were told that the test included samples of each of the eight types of analogies. Again, the test was not timed. Help with vocabulary was not given. Completion time was approximately 22 minutes.

Chapter 4

Findings and Discussion

Findings

The main purpose of this study was to develop analogies for secondary ESL students as a tool to help develop and improve thinking skills. Pre- and posttests consisting of 25 analogies each were developed and administered to six ESL secondary students. A comparison of pre- and posttest scores showed that the six students who participated in this study improved in their ability to reason analogically. The pretest scores ranged from 60 to 75. These scores were higher than had been anticipated because the students had exhibited very limited use of spoken English in previous classes. These scores also raise the question as to what factors could have contributed to the development of thinking skills required in solving analogies. A possible explanation is that ESL students need to reason analogically because they encounter unfamiliar material so often in academic situations. To resolve these situations, they relate familiar information with unfamiliar information, thus, reasoning analogically. Another possible explanation is that the students' abilities to comprehend spoken and written English may have been underestimated since

these abilities were not tested prior to the pretest.

The posttest scores ranged from 70 to 90. The gains in individual scores ranged from 5 to 15 points with all students showing gains. These scores seem to indicate that the students improved in their ability to work analogies. However, the major objective in the practice sessions was to improve rather than develop thinking skills used in reasoning analogically. This objective was based on the students' performance on the pretest. Perhaps a larger sample would have required development at least for some students.

During the field test the researcher noted that the students appeared to be consistently interested in working with analogies. This is supported by Bellows' (1980) report that students love to solve analogies.

Table 1 presents the following information for each of the six subjects: scores on the pretest and the posttest, number of sessions attended, individual gains, and a class average gain.

Table 1

Student Test Scores, Sessions Attended, and Gains

Subject	Sessions Attended	Pretest	Posttest	Gains
1	5	60	70	10
2	5	65	75	10
3	3	70	80	10
4	5	70	75	5
5	5	75	90	15
6	4	75	80	5
			Average Gain	9

To summarize the results, six ESL secondary students took a pretest and a posttest on formal analogies. Four students attended the five sessions; one, three sessions, and another, four sessions. The main finding was that based on pretest and posttest scores, all the students improved in their ability to solve analogies. Improvement rather than development of thinking skills used in solving analogies was a major objective during the five 50-minute sessions.

Conclusions

Based on the results of this study, the following

conclusions are in order.

1. Analogies that have an appropriate vocabulary level can be taught to ESL students even if those students exhibit limited speaking and reading abilities.

2. ESL students can be taught higher level thinking skills such as inference, analysis, evaluation, and synthesis through analogies.

3. The methodology used in this study is consistent with ESL methodology. In the process of solving analogies students listen, speak, read, and write. These skills are critical in the language development process of all students including ESL students.

4. Analogies may be specific to the needs and abilities of ESL students in that concepts and vocabulary in analogies may be expanded or restricted as required by the language proficiency level and intellectual ability of the students.

Discussion

One of the purposes of this study was to develop analogies for secondary ESL students as a tool for developing and improving higher level thinking skills. The reasons for conducting this study were twofold. First, ESL students need training in thinking skills to

achieve in the classroom and to cope with everyday situations in a new environment. Several writers support this view (Auerback and Burgess, 1985; Petrosky, 1982; Saville-Troike, 1984). Second, ESL materials that focus on developing thinking skills at the inferential and applied levels of reading are scarce (Auerback and Burgess, 1985). Although the review of literature refers to numerous studies on analogies as effective aids to learning and thinking, none was found that pertained to ESL students. This study offers a limited but practical response to this need. Analogies provide a tool for teaching critical thinking skills to ESL students.

In the field test, the presentation of two analogy types per session seemed to be effective because the vocabulary level and the concept load were restricted. In teaching ESL students these are important considerations. Given more time, one analogy type per session might work very well. Numerous methods for teaching analogies exist such as those used by Bellows (1980), Devall (1983), McGeehon (1982), and White and Alexander (1984). Whimbey and Lochhead's (1980) method, the one used in this study, seems well suited for ESL students. Students monitor each other as they think aloud, form relationship sentences, and check the

accuracy of their solutions by fitting both pairs of terms in slots in the relationship sentence. This process allows students to listen, speak, read, and write. The development of these skills is indispensable in the learning process of ESL students.

The terms for developing the analogies were selected from the Dale-Chall list of 3,000 words (1948) because the authors of the students' text, English for a Changing World (Wardhaugh et al., 1976), used the same source in writing the text. However, the students' vocabulary knowledge was not measured prior to testing. This raised the question whether errors resulted from a weakness in vocabulary or in reasoning ability. This shortcoming was complicated by the limited number of subjects and instructional sessions. A larger sample and a longer period for instruction would have obviously resulted in greater generalizability.

The results based on the pretest and posttest raised several speculative questions. These are:

1. What effect would prior instruction of vocabulary used in the analogies have on student performance?

2. What effect would a different methodology have?

3. Was the vocabulary in each test equally difficult?

4. How would scores of tests in first language compare with scores of tests in second language?

Recommendations

As a result of this study, the following recommendations are made:

1. Further investigative studies should be conducted to explore additional thinking skills pertinent to ESL students.

2. Studies or projects that develop ESL materials that foster thinking skills such as problem solving, inductive and deductive reasoning should be implemented.

3. Experimental studies that test the effectiveness of analogies as learning and thinking aids for ESL students should be conducted.

4. The teaching of analogies should not be restricted to one method. Teachers should select or create the method that is most suitable and effective.

Chapter 5

Summary

Secondary ESL reading materials generally lack higher level thinking skills such as analysis, inference, synthesis, and evaluation (Auerback and Burgess, 1985; Petrosky, 1982). Yet ESL students have an urgent need to develop these skills to achieve academically and to solve everyday problems in their new surroundings (Auerback and Burgess, 1985). As a response to this need, the writer developed 136 analogies as a tool to teach ESL students to read at the inferential and applied levels. The vocabulary source for the analogies was the Dale-Chall List of 3,000 Words (1948). This was also the vocabulary source for English for a Changing World (Wardhaugh et al., 1976), the ESL text used by the subjects in this study.

The subjects were six public school ESL students in grades 7, 8, and 9, who also attended a weekly evening class in a community school, the setting for the field test. During each of four 50-minute sessions the subjects studied two analogy types according to the Aristotelian paradigm (Devall, 1983). The presentation of two analogy types per session and the use of relationship sentences to check the accuracy of the

analogy solution seemed to be particularly effective techniques in teaching analogies to ESL students.

The generalizability of this study is limited by the small number of subjects and by the nonexperimental design. However, the analogies developed for ESL students should be beneficial. Controlled by vocabulary and concept, these analogies are especially appropriate for secondary ESL students. The literature supports the effectiveness of analogies as aids to learning and thinking.

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Appendices

Appendix A

Tests and Publishers

College Board Scholastic Aptitude Test (SAT)

Educational Testing Service

Princeton, NJ 08540

Preliminary Scholastic Aptitude Test (PSAT)

Educational Testing Service

Princeton, NJ 08540

California Achievement Test

CTB/McGraw-Hill

Del Monte Research Park

Monterey, CA 93940

Cognitive Abilities Test

Riverside Publishing Company

8420 Bryn Maur Avenue

Chicago, IL 60106

Woodcock Mastery Reading Test

American Guidance Service, Inc.

Publishers Building

Circle Pine, MN 55014

Appendix B

Analogies I†

An analogy is a special word problem with two word pairs. In an analogy both word pairs are related or compared in the same way.

1. First: last :: begin: _____.
   good-by start *end are
2. Laugh: cry :: sad: _____.
   *happy mean each o'clock
3. Inside: indoors :: outside: _____.
   jail hunt *outdoors picture
4. Man: male :: woman: _____.
   tired young friend *female
5. Eat: ate :: sit: _____.
   such bean *sat chair
6. See: saw :: was: _____.
   you *were who way
7. Twelve: dozen :: daily: _____.
   *everyday everywhere everybody everyone
8. Small: little :: perhaps: _____.
   sure *maybe no yes
9. Anywhere: everywhere :: all: _____.
   anyone none *everybody nobody
10. Have: had :: make: _____.
    take makes *made making
11. Child: children :: man: _____.
    woman mean *men women

* Indicates correct answer.
† See Appendix D for analogy types.

Analogies II

An analogy is a special word problem with two word pairs. Remember that in an analogy both word pairs are related in the same way.

1. Flour: flower :: right: _____.
   *write left correct wrong
2. Be: bee :: cent: _____.
   seen penny seem *sent
3. Read: dear :: war: _____.
   *raw saw bar ram
4. Loop: pool :: oh: _____.
   *ho hold old or
5. Cook: book :: light: _____.
   *night alike alive likely
6. Pill: mill :: yell: _____.
   sill *fell kill call
7. Or: ore :: cell: _____.
   smart slide slow *sell
8. Tip: pit :: top: _____.
   *pot pound pie pet
9. Dear: deer :: close: _____.
   cost *clothes cut door
10. Keep: peek :: reap: _____.
    please play pretty *pear
11. Led: lead :: piece: _____.
    *peace prize paid pail

Analogies III

An analogy is a special word problem with two word pairs. In an analogy both word pairs are related or compared in the same way. As you work each analogy, be sure to <u>say</u> how each pair of words is related. Work with your group or partner and try to agree on the solution.

1. Swing: playground :: bathtub: _____.
   bath *bathroom bathe bathing
2. Classroom: school :: cabin: _____.
   classmate airport *ship telephone
3. Page: book :: eraser: _____.
   pen *pencil paper write
4. Month: year :: day: _____.
   week Monday *night month
5. Day: hour :: hour: _____.
   second *minute o'clock time
6. Egg: shell :: banana: _____.
   yellow fruit *skin white
7. Bread: slice :: pie: _____.
   peace cake cut *piece
8. Arm: hand :: leg: _____.
   feet *foot toe nail
9. French: Indian :: baseball: _____.
   *football bat field team
10. Mother: father :: grandmother: _____.
    grandaughter grandma *grandfather grandson

Analogies IV

Solve the following analogies. Remember to tell your group or partner how each word pair is related.

1. Nose: mouth :: ear: _____.
   *eye head face hear
2. Onion: tomato :: peach: _____.
   tree potato *apple pie
3. Shirt: pants :: cotton: _____.
   *linen skirt blouse candy
4. Walnut: peanut :: elm: _____.
   fruit bark pear *oak
5. Spinach: vegetable :: jellyfish: _____.
   animal jelly *fish food
6. Rabbit: animal :: sparrow: _____.
   *bird fly insect butterfly
7. Christmas: holiday :: March: _____.
   day week *month year
8. Football: game :: hammer: _____.
   *tool nail saw carpenter
9. Tool: ax :: furniture: _____.
   sell paint *sofa buy
10. Clothes: coat :: animal: _____.
    *bear bean bead beard
11. Vegetable: potato :: language: _____.
    different learn easy *English

Analogies V

Solve the following analogies. Be sure to tell your partner or group how each word pair is related. Remember that each word pair must be related in the same way.

1. Spring: summer :: autumn: _____.
   October *winter fall year
2. Morning: noon :: afternoon: _____.
   *night late 8 o'clock soon
3. Sunrise: sunset :: daybreak: _____.
   date dark 6 o'clock *daytime
4. April: May :: November: _____.
   September February Christmas *December
5. Ten: twenty :: thirty: _____.
   ninety hundred *forty fifty
6. February: January :: July: _____.
   *June May April August
7. Second: first :: fourth: _____.
   fifth sixth *third eighth
8. Lunch: breakfast :: supper: _____.
   6 o'clock night food *lunch
9. Thursday: Wednesday :: Monday: _____.
   *Sunday Tuesday Friday Saturday
10. Evening: noon :: morning: _____.
    lunch now 12 o'clock *dawn

Analogies VI

Solve the following analogies. Tell your group or partner how each word pair is related.

1. Sheep: baa :: cow: _____.
   mew *moo milk may
2. Church: quiet :: circus: _____.
   *noisy clown people fun
3. Airplane: fly :: car: _____.
   run motor *drive stop
4. Bicycle: ride :: playhouse: _____.
   *play toy doll stay
5. Doctor: medicine :: lawyer: _____.
   listen *law liberty pay
6. Artist: art :: soldier: _____.
   battle *defense gun gunpowder
7. Penny: copper :: bars: _____.
   *steel windows stone straight
8. Desk: wood :: bottle: _____.
   drink jug perfume *glass
9. Speaker: speech :: clown: _____.
   *jokes mask merry greet
10. Spider: web :: bee: _____.
    home poison sting *honeycomb
11. Squirrel: tree :: snake: _____.
    beach *ground deep ditch
12. Cowboy: ranch :: king: _____.
    desert power *palace downtown

Analogies VII

Solve the following analogies. Think aloud and discover how the words in each pair compare or relate.

1. Pretty: beautiful :: cute: _____.
   nice real silly *pretty
2. Break: crush :: look: _____.
   see smile *stare light
3. Awful: terrible :: good: _____.
   food right bad *better
4. Like: love :: dislike: _____.
   enemy *hate admire heart
5. Teaspoon: tablespoon :: inch: _____.
   *foot pound ruler measure
6. Ocean: river :: ship: _____.
   swim vessel *rowboat waterproof
7. Hot: warm :: cold: _____.
   wind storm fresh *cool
8. Evil: bad :: best: _____.
   beauty *better rather least
9. Admire: like :: most: _____.
   *more less low love
10. Laugh: smile :: cry: _____.
    weary *frown weak sad

Analogies VIII

In an analogy, both word pairs go together in the same way. Discuss how the word pairs go together and solve each analogy.

1. Push: fall :: blow: _____.
   *pain pan horn hard
2. Noise: headache :: sleep: _____.
   sleepy *rest bed mattress
3. April showers: May flowers :: clouds: _____.
   storm *rain rainbow rainy
4. Sun: heat :: fire: _____.
   hot forest stove *blaze
5. Friendship: friends :: work: _____.
   housework manager *job savings
6. Rest: sleep :: learn: _____.
   college grades lessons *study
7. Eat: food :: drink: _____.
   *water cupful glass cup
8. Chickens: eggs :: sheep: _____.
   fur *wool kid gloves
9. Milk: cheese :: cream: _____.
   buttermilk tea ice *butter
10. Cow: milk :: honeybee: _____.
    honeymoon *honey homesick honest
11. Moon: moonlight :: sun: _____.
    sunny sunset *sunlight heaven

Appendix C

Scott, Foresman and Company 1900 East Lake Avenue Glenview, Illinois 60025 312/729-3000

Kathleen G. Manatt
Marketing Manager
Social Studies
Foreign Languages
English as a Second Language

October 23, 1985

Ms. Yolanda Rodriguez
2300 Yucca
Fort Worth, Texas 76111

Dear Ms. Rodriguez:

I have just discussed the source of the vocabulary list of English for a Changing World with the Executive Editor in charge of the project.

The vocabulary list was mainly determined by the program authors, who, as classroom teachers selected the words students most need to know based on the teachers' extensive classroom experience. In fact, this list then corresponds fairly closely to the Dale-Chall readability formula list, as both Dale-Chall and the ECW list are made up of vocabulary needed for essential day-to-day living.

I hope this answers your question. And good luck in your graduate studies.

Sincerely yours,

Kathleen Manatt

Kathleen G. Manatt
Product Manager, Social Studies

/map

Appendix D

The examples used in this table are from the Aristotelian paradigm.*

Types of Most Frequently Used Analogies

1. Comparison--Semantic
   - A. Antonym
     Example: Good:Bad::Up:Down
   - B. Synonym
     Example: Author:Writer::Artist:Painter
   - C. Word Relationship (Plural, Tense, etc.)
     Example: Foot:Feet::Hand:Hands

2. Comparison--Non-Semantic
   - A. Homonym
     Example: Bow:Bough::Do:Dew
   - B. Letter Relationship
     Example: Pat:Tap::Net:Ten
   - C. Word Relationship
     Example: Me:Card::Bar:Future

3. Portion Of
   - A. Part/Whole
     Example: Toe:Foot::Finger:Hand
   - B. Whole/Part
     Example: Year:Month::Week:Day
   - C. Part/Part
     Example: Eye:Ear::Eraser:Lead

4. Class
   - A. Co-ordination
     Example: Carrot:Beet::Peach:Apple
   - B. Sub-ordination
     Example: Frog:Amphibian::Dog:Mammal
   - C. Superordination
     Example: Bird:Wren::Flower:Rose

5. Sequence
   - A. Forward
     Example: January:February::July:August
   - B. Reverse
     Example: 4th:3rd::Senior:Junior

6. Characteristic
   A. Object compared to characteristic
      Example: Dog:Bark::Cat:Meow

   B. Instrument compared to its function
      Example: Stove:Cook::Ruler:Measure

   C. Person compared to his profession
      Example: Attorney:Law::Teacher:Education

   D. Object and material
      Example: Table:Wood::Pan:Metal

   E. Creator and creation
      Example: Poet:Poem::Author:Book

   F. Object and location
      Example: Animals:Zoo::Fish:Aquarium

   G. Association
      Example: Ham:Eggs::Bread:Butter

7. Degree of Intensity
   A. Lesser to Greater
      Example: Shut:Slam::Tap:Pound

   B. Greater to Lesser
      Example: Gigantic:Big::Scorch:Singe

8. Source
   A. Cause/Effect
      Example: Sun:Heat::Hit:Bruise

   B. Need/Satisfier
      Example: Thirst:Water::Hunger:Food

   C. Source/Product
      Example: Flax:Linen::Pig:Bacon

*Source: Devall, Y. L. (1983, May). Guide students to read critically through instructional use of analogies. Paper presented at the 28th annual meeting of the International Reading Association, Anaheim, CA. (ED 235 464)

Appendix E

Thinking Skills Training Programs

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Lipman, M., Sharp, A. M., & Oscanyan, F. S. Philosophy in the classroom (2nd ed.). Philadelphia: Temple University Press, 1980.

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Appendix F

Note. Appendixes are in the order received by ERIC.

Test I Analogies

Example:
Hot is to cold as night is to day.
Hot: cold :: night: day

1. Can: cannot :: always: _____.
   early late soon *never

2. Paste: glue :: journey: _____.
   walk drive *trip go

3. Arrive: arrived :: dance: _____.
   *danced stop begin music

4. Stair: stare :: their: _____.
   *there them they those

5. Ton: not :: pal: _____.
   pat *lap pull pill

6. Fix: six :: dig: _____.
   *jig jug beg bag

7. Second: minute :: minute: _____.
   house now *hour time

8. House: floor :: furniture: _____.
   clothes shoe wall *bed

9. Son: daughter :: brother: _____.
   *sister uncle aunt girl

10. Cat: dog :: kitty: _____.
    horse *puppy pony chicken

11. Thanksgiving: holiday :: June: _____.
    week *month day season

12. Music: song :: direction: _____.
    *east mile sun star

13. One: two :: three: _____.
    for *four fair five

Test I Analogies

14. Boy: baby :: woman: _____.
man father *girl lady

15. Bird: fly :: snake: _____.
ground land air *crawl

16. Baker: baking :: cook: _____.
food *cooking sing kitchen

17. Eraser: erase :: pencil: _____.
paper pen right *write

18. Sweater: wool :: desk: _____.
school *wood window room

19. Singer: song :: parents: _____.
grandfather home *child garden

20. Least: less :: more: _____.
*most my money live

21. Damp: wet :: cool: _____.
*cold water winter hot

22. Joke: laugh :: bad news: _____.
newspaper smile *cry sing

23. Read: book :: hit: _____.
*ball bat bed hammer

24. Milk: cookies :: bread: _____.
big better *butter barn

25. Grapes: wine :: trees: _____.
build *lumber look forest

Test II Analogies

Read each analogy carefully. Remember that in an analogy the word pairs are related in the same way.

1. Head: toe :: top: _____.
   *bottom down above below
2. Wet: dry :: cold: _____.
   hotter *hot colder warm
3. Right: left :: arrive: _____.
   now *leave good by forget
4. Shout: yell :: leap: _____.
   walk bounce *jump run
5. Ash: ashes :: box: _____.
   *boxes boxcar boxer bow
6. See: sea :: for: _____.
   fix far fire *four
7. Eh: he :: on: _____.
   nor one once *no
8. Tap: pat :: now: _____.
   *won war worn win
9. Take: lake :: sack: _____.
   *pack neck quick quart
10. Arithmetic: spelling :: north: _____.
    direction map street *west
11. October: November :: Monday: _____.
    Friday *Tuesday Saturday Sunday
12. Purple: color :: diamond: _____.
    stair still *stone bright

Test II Analogies

13. Toast: bread :: strawberry: _____.
food plant *berry good

14. Insect: fly :: fruit: _____.
pickle picnic pumpkin *plum

15. Two: four :: six: _____.
eighty *eight twelve seven

16. Morning: noon :: afternoon: _____.
*evening sunset sunrise now

17. Crown: gold :: locomotive: _____.
*iron silver wood train

18. Tailor: suits :: shoemaker: _____.
leather *shoes shirts repair

19. Fish: water :: birds: _____.
nest near *air far

20. Blue: sky :: green: _____.
*grass cheese apples grapes

21. Stop: red :: go: _____.
car *green yellow traffic

22. Newspaper: news :: library: _____.
*books card papers quiet

23. Hot: hotter :: cold: _____.
cool coldest *colder cooler

24. Sick: weak :: hate: _____.
love like *dislike live

25. Trees: wood :: rivers: _____.
*fish farm flowers field

Appendix G

Sample Relationship Sentences

I. Comparison: Semantic

Antonym

The opposite of _____ is _____.

Synonym

_____ and _____ have the same meaning.

Word Relationship (Plural, Tense, etc.)

_____ is singular and _____ is plural.

_____ is a present tense verb _____ is a past tense verb.

II. Comparison: Non Semantic

Homonym

_____ and _____ sound the same.

Letter Relationship

In _____ and _____ the letters are reversed.

Word Relationship

_____ and _____ are alike except for the initial letter.

III. Portion of

Part/Whole

A _____ is part of a _____.

Whole/Part

(A)(n) _____ includes (a)(n) _____.

One part of (a)(n) _____ is (a)(n) _____.

Part/Part

(A) _____ and (a) _____ are equal parts of a larger group.

The _____ and the _____ are equal parts of a larger group.

IV. Class

Co-ordination

_____ and _____ belong to the same larger group.

Sub-ordination

(A) _____ is a kind of _____.

Superordination

A kind of _____ is a(n) _____.

V. Sequence

Forward

_____ comes before _____.

_____ precedes _____.

Reverse

_____ follows _____.

_____ comes after _____.

VI. Characteristic

Object compared to characteristic

(A) _____ generally _____(s).

_____ say _____.

(A) _____ is generally _____.

Instrument compared to its function

A(n) _____ is made to _____.

Person compared to his profession

The profession of a(n) _____ is _____.

Object and material

(A) _____ is made of _____.

Creator and creation

The creation of a _____ is (a)(n) _____.

Object and location

(A) _____ (are)(is) found (in)(on) (a)(the) _____.

Association

_____ and _____ go together most of the time.

_____ and _____ are associated.

VII. Degree of intensity

Lesser to greater

_____ is less than _____.

_____ is a mild form of _____.

Greater to lesser

_____ is greater in intensity than _____.

To _____ is more extreme than to _____.

VIII. Source

Cause/Effect

(A) _____ may cause _____.

(The)(A) _____ can produce (a) _____.

Need/Satisfier

The need for _____ is satisfied by _____.

A person who needs (to) _____ may _____.

_____ is satisfied by _____.